Montana Comprehensive Assessment System (*MontCAS CRT*)

GRADE 10
COMMON RELEASED ITEMS
SPRING 2013

MontCAS
Montana Comprehensive Assessment System
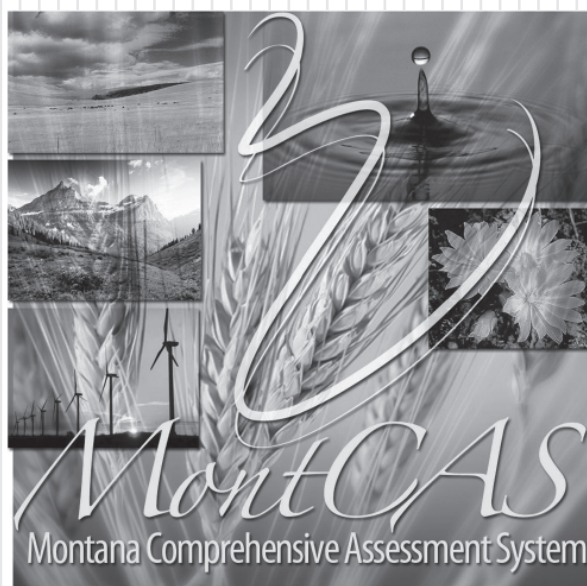
Montana
Office of Public Instruction
Denise Juneau, State Superintendent

opi.mt.gov

Reading Directions

This Reading test contains three test sessions. Mark or write your answers in the Answer Booklet. Use a pencil to mark or write your answers.

This test includes two types of questions: multiple-choice and constructed-response questions.

For the multiple-choice questions, you will be given four answer choices—A, B, C, and D. You are to choose the correct answer from the four choices. Each question has only one answer. After you have chosen the correct answer to a question, find the question number in your Answer Booklet and completely fill in the circle for the answer you chose. Be sure the question number in the Answer Booklet matches the question number in the Test Booklet. The example below shows how to completely fill in the circle.

CORRECT MARK	INCORRECT MARKS
●	○ ⊙ ◖ ⊘

If you decide to change your answer to a question, erase the wrong mark completely before filling in the circle of the new answer. Be sure you have only one answer marked for each question. **If two circles are bubbled in for the same question, that question will be scored as incorrect.**

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For the other types of questions in the Test Booklet, you will be asked to write your answers in the box provided. Read the question carefully. If a question asks you to explain your answer or to show your work, be sure to do so.

You may make notes or use highlighters in your Test Booklet, but you must bubble or write your final answers in your Answer Booklet. **Do not make any stray or unnecessary marks in your Answer Booklet.**

Let's work through a sample question together to be sure you understand the directions.

Sample Question

1. What is the capital of Montana?

   A. Browning

   B. Glendive

   C. Helena

   D. Missoula

In this article, Adam, Jamie, and Peter from the TV show MythBusters *figure out if running through the rain keeps you drier than walking through it. Read the article and then answer the questions that follow.*

Is It Worth Running in the Rain?

Keith and Kent Zimmerman

Running through raindrops: Are the MythBusters on the level or are they all wet?

The Myth: If you get caught in the rain, will you stay drier if you walk or run? Running seems like plain old common sense, but since when have the MythBusters ever let common sense get in the way of an experiment?

The Plan: In order to answer this mythical query, the MythBusters recreated controlled conditions involving the velocity of rain.

4   ADAM: "The setup included a one-hundred-foot-long indoor course, which Jamie and I walked through—and then ran through—during a simulated downpour of homemade rain. In order to accurately perform the experiment, we manufactured some precise precipitation. Then, while both walking *and* running, we wore identical cotton coveralls, which were then weighed after each test to see how much water they had soaked up."

5   In order to gain consistent and reliable results, the trickiest part of the process, according to Jamie, was getting a reliable and consistent rain—something realistic, with the proper velocity, the right raindrop size, and an even spread of rainfall over the entire hundred-foot distance. When taking their test jaunts, Adam and Jamie also had to make sure their perspiration wouldn't mix with the rain and taint the data. So both elected to wear something snug and form-fitting underneath their coveralls—skintight latex outfits.

PETER: "How big is a raindrop? Rain has to fall from a certain height before it actually becomes a raindrop. It breaks up once it gets to a certain speed. It has a certain velocity. It hits the ground at a certain rate. Then there's the question of, How hard is the rain falling? What's average rainfall (which we concluded might be one and a half to two inches per hour)? It's an incredibly detailed experiment, which is often the case. Things you think will be very simple turn out to be extremely difficult and have a huge number of variables."

Using a hose and squirting water downward wasn't going to simulate real rainfall, so the next step was to buy the necessary piping in order to build a man-made downpour system. Adam's rain system needed to generate actual raindrops that could achieve terminal velocity. (Note: After falling 60 feet, a drop of water

Terminal Velocity

22 fps

60

147
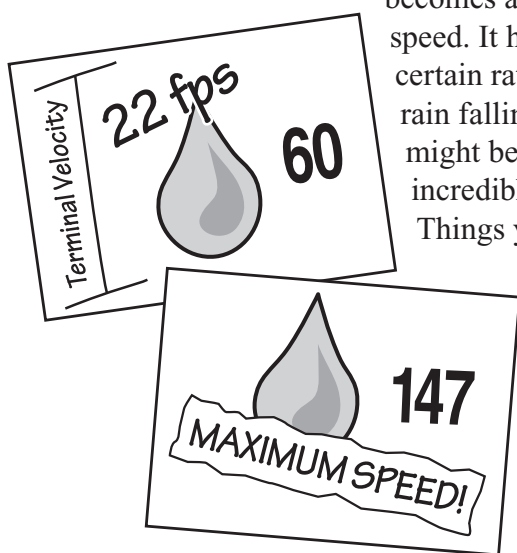
MAXIMUM SPEED!

travels at a maximum speed of nearly 22 feet per second, after which a drop cannot go any faster, no matter how far it plummets toward the Earth.)

Adam's rain delivery system was located inside an abandoned military hangar. It was comprised of 150 feet of pipe with sprinkler heads installed every 6 feet. Jamie supplied the water by legally tying into a nearby fire hydrant. The MythBusters then learned that accessing water is one thing, but getting it to travel 60 feet straight up into the air is quite another.

JAMIE: "According to my calculations, the water needed to be pumped at fifteen pounds per square inch in order to simulate a real rainstorm. Fortunately, we were able to secure a pump capable of pumping up to fifty-five pounds per square inch."

With Adam's pipes and sprinkler heads in place, and Jamie's water pumping, the MythBusters gave their rainy course its first dry run. After a few short test rains, they achieved precisely the amount of rainfall they were looking for—between 2 and 3 inches an hour. Digital gauges were then set out along the 100-foot walking/running course to verify the rainfall. On some of the tests, the MythBusters added wind, using fans, as a variable.

Finally, it was time to begin the tests.

The Experiment:

ADAM: "Step one was to make the rain more visible by using red dye. Step two was to put on the coveralls. [Each pair weighed approximately 757 grams.] Step three was to find an answer to this age-old mystery: Is it better to walk or run in the rain? A high-speed camera running at a thousand frames per second captured every single step and raindrop."

13 JAMIE: "We each walked the eighteen-second course twice, once with wind, once without. Each take was timed, and then the coveralls were immediately removed and set onto the scales. After both his walks, Adam's coveralls weighed in at 785 grams. After my walks, the coveralls soaked in almost the same amount of water."

What happened when Adam and Jamie picked up the pace and ran? Adam's coveralls weighed in at around 798 grams. On Jamie's run, the difference wasn't as great: The coveralls weighed 793 grams. But surprisingly, the MythBusters' raw data pointed to an answer that flew in the face of common sense. It makes a difference whether you walk or run.

The Result:

15   PETER: "This was another story where we went and interviewed experts from the National Oceanographic Atmospheric Administration. They had done a test wherein they went out into the rain and ran a course that was roughly one hundred feet. They came up with the conclusion that it's better to run because you spend less time in the rain. But our results were totally counterintuitive. It was better to walk. We were the first to actually try to build controlled rain with a hundred-foot sprinkler system in this forty-eight-foot-tall building that was used for painting airplanes out at Alameda. You could see their minds turning at the NOAA: 'Yes, that's right. The arms become horizontal surfaces and so do the legs when you're running. And horizontal surfaces, obviously, catch more rain.'"

Myth Status: Busted

16   ADAM: "The results weren't what I'd expected at all. Over that distance, our data showed that it was actually better to walk because you were presenting less of a surface for the rain. It was mostly falling on your shoulders and your head, whereas if you are running, you're also taking drops on the front. Our suits showed a huge amount of moisture on our legs—when you run you make your legs go vertically higher."

17   JAMIE: "It's better to walk than run. It was very clear. On a hundred-foot course with two to three inches of rain delivery per hour, we got more rain per foot running than we did while walking. This myth is busted. It's better to walk than to run in the rain."

Scientific Principle

ADAM: "To me, running in the rain is the single best example of how difficult it is to scientifically frame a simple question. Over a certain period of time, everybody experiences the same amount of wetness. How do you even determine how long to run? Because arbitrarily it's entirely possible that at a hundred fifty feet, it's better to run. If you had a grant to test it, you would have to test it over fifty, a hundred, a hundred fifty, two hundred, three hundred feet, walking, running at different average paces with both men and women. Different storm cycles and wind conditions. It's never as simple as it seems. We'd love to have the time to go out there and do that test for three or four more days and try to do all those and show the graphs."

PETER: "Everything that we do—and I can't emphasize this enough—is based on exactly what you would do in a scientific study, which is to look at the previous research and look at the things they took into consideration. The more you can reproduce what someone else has done and go from there, the better your results will be."

1. What is the **main** purpose of paragraph 4?

   A. to emphasize the challenges of working as a team

   B. to describe the necessary regulation of factors

   C. to illustrate the need to conduct the experiment indoors

   D. to explain the importance of wearing the same clothes

2. Which statement **best** explains the reason for coloring the rain?

   A. It prevents the reuse of already wet coveralls.

   B. It makes it obvious where the rain hits the coveralls.

   C. It separates the test rain from the natural rain.

   D. It makes monitoring the rate of rain easier.

3. Based on the article, all of the equipment was necessary for the experiment **except** the

   A. camera.

   B. coveralls.

   C. pump.

   D. showerheads.

4. In paragraph 15, what does Peter suggest when he says, "You could see their minds turning at the NOAA"?

   A. The NOAA became defensive of their own work.

   B. The NOAA regretted publishing their results.

   C. The NOAA felt overwhelmed by the information.

   D. The NOAA recognized the error in their findings.

5. The addition of which image to the article would **most** help the reader understand the experiment?

   A. a photograph of rain taken by the high-speed camera

   B. a diagram of the sprinklers and their water source

   C. a wide-angle view of the pipe along the course

   D. a graph of the moisture level of the coveralls

6. How does the section **Scientific Principle** differ from the previous three sections?

   A. It emphasizes that the experiment was performed professionally.

   B. It questions what could be done rather than what was done.

   C. It cautions the reader about breaking the laws of science.

   D. It explains why incorrect ideas become so popular.

7. Which statement **best** reflects Adam's thoughts in the first paragraph of the **Scientific Principle** section?

   A. Additional experiments could yield different accurate results.

   B. We enjoyed getting better results than the weather scientists.

   C. Simplifying this experiment was the key to it being a success.

   D. Our experiment has finished this particular myth once and for all.

8. According to the article, what was **most** important to the success of the experiment?

   A. brainstorming with scientists

   B. controlling the variables

   C. measuring in grams

   D. using digital gauges

9. Based on the article, how do myths get established in society?

   A. People enjoy reading them.

   B. People fail to examine them.

   C. They are true to actual events.

   D. They appear in the news.

10. Which question **most likely** led the experimenters to wonder if it is worth running in the rain?

    A. What is something that people assume is true but might not be true?

    B. What is something that people need to know about but do not know?

    C. Why is it that a raindrop does not travel faster beyond 60 feet?

    D. Why is it that a raindrop can fall 22 feet per second but no faster?

11. Which quotation from the article is an example of an opinion?

    A. "the trickiest part of the process, according to Jamie, was getting a reliable and consistent rain" (paragraph 5)

    B. "'the coveralls soaked in almost the same amount of water.'" (paragraph 13)

    C. "'Our suits showed a huge amount of moisture on our legs—when you run you make your legs go vertically higher.'" (paragraph 16)

    D. "Jamie: 'It's better to walk than run. It was very clear.'" (paragraph 17)

12. Based on the article, what makes the name MythBusters appropriate for Adam, Jamie, and Peter?

    A. They make a mess when they run their tests.

    B. They explain their ideas in a creative manner.

    C. They separate rumors from reality.

    D. They make science understandable for all ages.

13. Explain how the controls in the experiment served the MythBusters' purpose. Use information from the article to support your answer.

Scoring Guide

Score	Description
4	Response provides a thorough explanation of how the controls in the experiment served the MythBusters' purpose. Explanation includes specific, relevant information from the article.
3	Response provides an explanation of how the controls in the experiment served the MythBusters' purpose. Explanation includes supporting information from the article but lacks specificity, relevance, and/or development.
2	Response provides a partial explanation of how the controls in the experiment served the MythBusters' purpose. Explanation includes limited information from the article and/or is partially correct.
1	Response makes a vague or minimal explanation of how the controls in the experiment served the MythBusters' purpose.
0	Response is totally incorrect or irrelevant.
Blank	No response.

Training Notes

How controls in the experiment served the MythBusters' purpose may include, but need not be limited to:

Control	Purpose
100' course	ensure consistent amount of exposure
Done twice at a walk, twice at a run	ensure consistent amount of exposure
Water pumped at 15 psi	Produce raindrop velocity of 22 fps
Latex undergarments	To keep sweat from being absorbed by the coveralls
Rain gauges	Get the water flow to replicate real rainstorm
Weighed coveralls before and after trials	Measure the amount of water absorbed to prove that more water is absorbed by horizontal surfaces

Other relevant details from the article may also be cited.

Example of Score Point 4

First, the airplane hangar was an excellent area to perform such an experiment because it was closed off from external variables, which eliminated interference. The sprinkler heads installed every six feet controlled where the water fell. The pump they used also helped them pump how much water they needed to the desired area they were skeptical the water would reach. The test rains and dry run were a good way of noting where at in the experiment they needed work, and where they were fine. The digital gauges set along the course helped them because it told them how the sprinklers were doing as far as letting the same amount of water out by each sprinkler. The coveralls weighing the same and made out of the same material helped them know that the material was not a variable, but a control. The red dye that showed where the water landed helped identify the difference of landing area between walking and running.

8

Example of Score Point 3

In any scientific experiment, controls are keys to successfully finding a true conclusion. This also proved to be the case with the Mythbusters test.

First, the most important control was to precisely make legit and realistic rainfall. Without this, every run would have had a different amount of rain.

Second, the suits to measure how much rainfall absorbed had to be the same because Jamie and Adam were comparing with each other.

Finally, the course size had to be the same, again for comparison reasons. However, Adam did explain more tests could be done for further investigation.

Example of Score Point 2

Sample 1

> The controls in the experiment served the team's purpose by allowing them to use the necessary equipment. They controlled how much rain came down, how much wind there was, and also how far they were running. If they did not control it, they might never have had accurate results.

Example of Score Point 2

Sample 2

> The Mythbusters took alot in mind to solve this myth. The fans helped make the tests more realistic the red rain could be seen easily and was accurate to real rainfall. Highspeed cameras helped them analyze the data in ways you can't without and finally the latex suits made the test even more accurate.

Example of Score Point 1

> Without controls you don't have a controlled experiment. And that can lead to inaccurate results. These controls helped Mythbusters to prove whether you get more wet walking or running. And to "bust" their myth.

Example of Score Point 0

Well tomake it rain inside ofabuilding would be hard especially what kinds of rain there is. So you would need the right set of tools.

Read this passage about Costa Rican food and how to make tortilla soup. Then answer the questions that follow.

Costa Rica
Carole Lisa Albyn and Lois Sinaiko Webb

Costa Rica is known as a land of peace and democracy, and it is one of the most stable democracies in the region. It is a fertile country, and people successfully grow coffee, bananas, sugar cane, rice, corn, and cocoa. The coffee, which is of very high quality, sugar, and bananas are all exported around the world. Geographically, the country is a fisher's paradise, having 125 miles of coastline along the Caribbean Sea and over 600 miles along the Pacific Ocean. Seafood is an important part of the diet, and it is commonly served at dinner. Dinners usually consist of salad, soup, meat such as fish or roast beef, rice or corn, fruit juice to drink, and dessert, which may be ice cream with fruited jello, pudding, or cake. Salads may be palm hearts with a little vinegar and oil dressing or lemon juice. The corn grown has large, white kernels, and it is never served on the cob but is ground up to make tortillas. Tortilla soup is a delicious way to start dinner.

Tortilla Soup

Yield: Serves 6

2 to 4 tablespoons vegetable oil
3 corn tortillas, cut into 1/2-inch wide strips
1 onion, finely chopped
6 cloves garlic, finely chopped, or 2 teaspoons
    garlic granules
2 stalks celery, finely chopped
1 cup boneless, skinless, finely diced raw chicken
4 cups chicken broth, homemade or canned
1 cup canned stewed tomatoes
1 teaspoon *each* cumin, chili powder
1 tablespoon chopped fresh cilantro/coriander
1 bay leaf
salt and pepper to taste
1/2 cup sour cream, more or less, for serving
2 avocados, peeled, seeded, and cubed, more or
    less, for serving
1/2 cup shredded Monterey Jack cheese, more or
    less, for serving

Equipment: Large-size saucepan or Dutch oven, slotted mixing spoon, paper towels

1. Heat 2 tablespoons oil in saucepan or Dutch oven over medium-high heat, add tortillas, mix well, and fry until crisp. Remove tortillas with slotted spoon, drain on paper towels, and set aside.
2. Heat remaining 2 tablespoons oil in saucepan or Dutch oven over medium-high heat, add onion, garlic, celery, and chicken, mix well, and cook for about 3 minutes until onions are soft. Add chicken broth, tomatoes, cumin, chili powder, cilantro, and bay leaf and bring to a boil. Reduce heat to simmer, and, stirring frequently, cook for 30 minutes. Remove bay leaf; discard before serving. Add salt and pepper to taste.

To serve, put a few tortilla strips in the bottom of individual soup bowls, add a spoon each of sour cream, avocado, and cheese, and then add hot soup. Serve with remaining chips, sour cream, avocado, and cheese in separate bowls to add to soup if desired.

14. What is the **most likely** reason the people of Costa Rica eat what they do?

    A. They are able to import and export many foods.

    B. They are a democratic nation with varied tastes.

    C. They have fertile land and two coastlines to fish.

    D. They have many customary cooking habits.

15. Which entry in the list of ingredients allows the cook to make a choice?

    A. "3 corn tortillas, cut into 1/2-inch wide strips"

    B. "1 cup canned stewed tomatoes"

    C. "1 teaspoon *each* cumin, chili powder"

    D. "1/2 cup sour cream, more or less, for serving"

16. When serving the tortilla soup, what should a person first add to each bowl?

    A. avocado

    B. cheese

    C. hot soup

    D. tortilla strips

17. Based on the recipe, how much time is needed from start to finish to prepare tortilla soup?

    A. 3 minutes

    B. 30 minutes

    C. exactly 33 minutes

    D. more than 33 minutes

18. This soup recipe was **most likely** selected to represent Costa Rican food because it

    A. promotes corn, a major Costa Rican export.

    B. uses corn tortillas, a typical Costa Rican food.

    C. requires very few special ingredients.

    D. is hearty enough to be a meal in itself.

19. Which sentence from the first paragraph is an opinion?

   A. "It is a fertile country, and people successfully grow coffee, bananas, sugar cane, rice, corn, and cocoa."

   B. "Seafood is an important part of the diet, and it is commonly served at dinner."

   C. "Salads may be palm hearts with a little vinegar and oil dressing or lemon juice."

   D. "Tortilla soup is a delicious way to start dinner."

20. Which book would **most likely** provide instructions on how to make the tortillas used in tortilla soup?

   A. *From Ground to Round: Corn Recipes*

   B. *A Restaurant Guide: Central America*

   C. *Growing Tropical Fruits and Vegetables*

   D. *Seafood and Salads of Caribbean Cultures*

Excerpt from *An Island Garden*

Celia Thaxter

After the storm, in the clear, beautiful morning, before sunrise, I went as usual into the garden to gather my flowers. To and fro, up and down over the ruined bank I passed; the wind blew cool and keen from the west, though the sky was smiling. The storm had beaten the flowers flat all over the slope; in scarlet and white and blue and pink and purple and orange bloom they were prostrate everywhere, leaves, stalks, blossoms, and all tangled and matted in an inextricable confusion. Swiftly I made my way through it, finding a foothold here and there, and stooping for every freshly unfolded cup or star or bell whose bud the <u>tempest</u> had spared. As I neared the little western gate with my hands full of blossoms to enter the garden on my way to the house, I was stopped still as a statue before a most pathetic sight.

There, straight across the way, a tall Poppy plant lay prone upon the ground, and clinging to the stem of one of its green seed-pods sat my precious pet humming-bird, the dearest of the flock that haunt the garden, the tamest of them all. His eyes were tightly closed, his tiny claws clasped the stem automatically, he had no feeling, he was rigid with cold. The chill dew loaded the gray-green Poppy leaves, the keen wind blew sharply over him,—he is dead, I thought with a pang, as I shifted my flowers in a glowing heap to my left arm, and clasped the frozen little body in the palm of my right hand. It was difficult to disengage his slender wiry claws from their close grip on the chilly stalk, but he never moved or showed a sign of life as I took him off. I held him most tenderly in my closed hand, very careful not to crush or even press his tiny perishing body, and breathed into the shut hollow of my palm upon him with a warm and loving breath. I was so very busy, there were so many things to be done that morning, I could not stop to sit down and nurse him back to life.

But I held him safe, and as I went up and down the garden paths gathering the rest of my flowers, I breathed every moment into my hand upon him. Ten, fifteen, twenty minutes passed; he made no sign of life. Alas, I thought, he is truly dead; when all at once I felt the least little thrill pass through the still, cold form, an answering thrill of joy ran through me in response, and more softly, closely, tenderly yet I sent my warm breath to the tiny creature as I still went on with my work. In a few minutes more I began to feel the smallest fluttering pulse of life throbbing faintly within him; in yet a few moments more he stirred and stretched his wings, comforting himself in the genial heat. When at last I felt him all alive, I took a small shallow basket of yellow straw, very small and light, and in it put a tuft of soft cotton wool, filled a tiny glass cup with sugar and water, honey-thick, placed it in the basket by the cotton, then gently laid the wee bird on the warm fluff. His eyes were still closed, but he moved his head slowly from side to side.

The sun had risen and was pouring floods of light and heat into the garden. I carried the basket out into the corner where the heavenly blue Larkspurs stood behind the snow-whiteness of the full blossoming Lilies, and among the azure spikes I hung the pretty cradle where the sunbeams lay hottest and brightest on the flowers. The wind, grown balmy and mild, rocked the tall flower-spikes gently, the basket swayed with them, and the heat was so reviving that the dear little creature presently opened his eyes and quietly looked about him. At that my heart rejoiced. It was delightful to watch his slow return to his old self as I still went on with my work, looking continually toward him to see how he was getting on. The ardent sunbeams sent fresh life through him; suddenly he rose, an emerald spark, into the air, and quivered among the blue flowers, diving deep into each winged blossom for his breakfast of honey.

21. In the first paragraph, what do the words "the wind blew cool and keen from the west, though the sky was smiling" **mainly** suggest?

   A. It was a promising day despite the chilly breeze.

   B. It was a dark day despite the rain having passed.

   C. It was an exciting day because a party was planned.

   D. It was a breezy day that cleaned the dust from the land.

22. What does the word <u>tempest</u> mean as it is used in the first paragraph?

   A. animals

   B. fences

   C. storm

   D. sun

23. At the beginning of this passage, the garden setting can **best** be described as

   A. disordered.

   B. isolated.

   C. neat.

   D. quiet.

24. The details about the basket **best** demonstrate the narrator's

   A. artistic abilities.

   B. knowledge of nests.

   C. concern for the bird.

   D. desire to tame the bird.

25. The narrator's attitude toward the hummingbird's "return to his old self" is **best** described as

A. humble.

B. joyful.

C. mournful.

D. mystical.

26. This passage is **mostly** about how

A. birds bring beauty to life.

B. flowers saved a bird's life.

C. storms are a danger to birds.

D. kindness saved a bird's life.

27. The narrator **most likely** tells about her experience to

A. explain how to care for sick hummingbirds.

B. share a story about a favorite hummingbird.

C. describe the differences among types of flowers.

D. encourage people who want to grow island gardens.

Mathematics Directions

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Let's work through a sample question together to be sure you understand the directions.

Sample Question

1. Montana is the **fourth** largest state. How many states are larger than Montana?

   A. 1
   B. 3
   C. 10
   D. 42

Mathematics (No Calculator)

1. Two line segments $\overline{AB}$ and $\overline{CD}$ are parallel. If A has coordinates (2, 7) and B has coordinates (4, 3), which of the following could be the coordinates of C and D?

   A. (–2, 5) and (2, 7)
   B. (–1, 9) and (2, 3)
   C. (4, 3) and (6, 4)
   D. (1, 4) and (4, 10)

2. Which statement is true?

   A. $\dfrac{60}{11} < 5\dfrac{1}{2} < 5.\bar{5}$

   B. $\dfrac{60}{11} < 5.\bar{5} < 5\dfrac{1}{2}$

   C. $5.\bar{5} < \dfrac{60}{11} < 5\dfrac{1}{2}$

   D. $5.\bar{5} < 5\dfrac{1}{2} < \dfrac{60}{11}$

3. Heather paid $18.95 for a basket of apples. There were a total of 47 apples in the basket. Which amount is closest to the cost for each apple in the basket?

   A. $0.50
   B. $0.40
   C. $0.30
   D. $0.20

4. Write 6.07×10^{-4} in standard form.

5. Evaluate:

$$\frac{4+5}{2} \div \frac{1}{3}$$

6. A carpenter uses screws and wooden boards to build a deck. Last week, he bought 3 boxes of screws that each cost the same amount of money. He also bought 20 boards that each cost the same amount of money. The total cost of his purchase was $218.

   a. Write an equation that can be used to find x, the cost in dollars of each box of screws, and y, the cost in dollars of each wooden board the carpenter bought last week.

   The carpenter has another deck to build this week. He bought more of the same type of screws and wooden boards. For this deck, he bought 6 boxes of screws and 30 wooden boards. The total cost of the purchase was $336.

   b. Write an equation that can be used to find x, the cost in dollars of each box of screws, and y, the cost in dollars of each wooden board the carpenter bought **this** week.

   c. Use the equations from parts (a) and (b) to find the cost of each box of screws and the cost of each wooden board. Show or explain how you found your answer.

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes

Part a: 1 point correct equation, $3x + 20y = 218$
Part b: 1 point correct equation, $6x + 30y = 336$
Part c: 2 points correct answer, $x = 6$, with work shown or explanation given
OR
correct answer based on incorrect equations from parts (a) and (b)

OR

1 point correct answer with incomplete work or no explanation
OR
correct solution for only one variable
OR
correct solution for one variable by substitution based on incorrect value of other variable

Sample Response:

a. $3x + 20y = 218$

b. $6x + 30y = 336$

c. Box of screws = \$6, Wooden board = \$10

$$\begin{aligned}-2(3x + 20y = 218)\\6x + 30y = 336\end{aligned} \quad \Rightarrow \quad \begin{aligned}-6x - 40y = -436\\6x + 30y = 336\\\hline -10y = -100\\\frac{-10y}{-10} = \frac{-100}{-10}\\y = 10\end{aligned}$$

$$\begin{aligned}3x + 20y &= 218\\3x + 20(10) &= 218\\3x + 200 &= 218\\3x &= 18\\\frac{3x}{3} &= \frac{18}{3}\\x &= 6\end{aligned}$$

Example of Score Point 4

a) $218 = 3x + 20y$
b) $\$336 = 6x + 30y$

c) $6x + 30y = 336$
$2(3x + 20y = 218)$

$6x + 30y = 336$
$6x + 40y = 436$

$6x + 40y = 436$
$-\ 6x + 30y = 336$

$\dfrac{10y}{10} = \dfrac{100}{10}$

$y = 10$

$3x + 20(10) = 218$

$3x + 200 = 218$
$-200\ -200$

$\dfrac{3x}{3} = \dfrac{18}{3}$

$x = 6$

Box of screws = $\$6$
Wooden board = $\$10$

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Example of Score Point 3

$$\text{A) } 3x + 20y = \$218$$
$$\text{B) } 6x + 30y = \$336$$
$$\text{C) } (3x + 20y = 218)-2$$
$$-6x - 40y = \cancel{4}36$$
$$6x + 30y = 336$$
$$\frac{-10y = 100}{-10 \quad -10}$$
$$\boxed{y = 10}$$

Example of Score Point 2

$x = $ boxes of srews $y = $ boards   (costs)

a. $3x + 20y = 218$

b. $6x + 30y = 336$

c.   [a]

   $3x + 20y = 218$ $3x + 20y = 218$
   $3(0) + 20y = 218$ $3x + 20(0) = 218$
   $ 20y = 218$ $ 3x = 218$
   $ y = 19$ $ x = 72.6$

   [b] $6x + 30y = 336$ $6x + 30y = 336$
   $ 6(0) + 30y = 336$ $6x + 30(0) = 336$
   $ 30y = 336$ $ 6x = 336$
   $ y = 11.2$ $ x = 56$

Example of Score Point 1

(a) $(218 \div 200) \div 3 = x$ $(218 - 18) \div 20 = y$

(b) $(336 - 300) \div 6 = x$ $(336 - 36) \div 30 = y$

(c) last week → screws = \$6 boards = \$6

this week → screws = \$6 boards = \$10

I found my answer by following my equations in the above answers.

Example of Score Point 0

3 boxes of screws/6 boxes of screws
20 boards/30 boards

a.) $3x + 2x = 218$

X would have to be how much they both cost.

b.) $6x + 3y = 336$

X would find the cost of the screws and Y would be the cost of boards.

c.) $3x + 2x = 218$ $6x + 3y = 336$
    $\frac{5x}{5} = \frac{218}{5}$ $9x = 336$

    $X = 43?$ 37.33

You would just need to find the price of either the screws/boards because they cost the same it says.

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7. The city parks department plans to conduct a survey of 500 city residents, asking them how often they visit the city's parks. Which group would be most appropriate to survey?

   A. 500 randomly selected high school students

   B. 500 people randomly selected as they arrive at a city park

   C. 500 randomly selected apartment residents

   D. 500 people randomly selected from a list of city residents

8. Which situation could be represented by an exponential function?

   A. the cost of gas as it relates to gallons pumped

   B. the total cost of a boat rental as it relates to hours rented

   C. the height of a thrown ball as it relates to the time elapsed since release

   D. the number of bacteria cells present over time as it relates to the division of the cells

9. Study triangle *PQR* below.
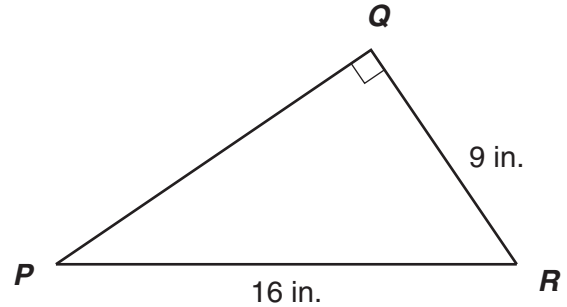
   Which expression is equal to the measure of $\angle P$?

   A. $\cos^{-1}\left(\dfrac{9}{16}\right)$

   B. $\cos^{-1}\left(\dfrac{16}{9}\right)$

   C. $\sin^{-1}\left(\dfrac{9}{16}\right)$

   D. $\sin^{-1}\left(\dfrac{16}{9}\right)$

10. At a banquet, guests can choose

 - one main course (roast beef, fish, or vegetarian),
 - one salad (coleslaw, bean salad, mixed greens, or fruit salad) and
 - one dessert (pie or sherbet).

How many different possibilities are there for a meal of one main course, one salad, and one dessert?

A. 9

B. 12

C. 24

D. 48

11. A cube is cut by a plane. The plane passes through the midpoints of three edges that share the same vertex. What is the shape of the resulting cross section?

A. an equilateral triangle

B. an obtuse triangle

C. a right triangle

D. a scalene triangle

12. Integers m and k are both prime numbers greater than 2. Which statement about the sum $m + k$ is **always** true?

A. The sum $m + k$ is prime and even.

B. The sum $m + k$ is composite and odd.

C. The sum $m + k$ is even.

D. The sum $m + k$ is odd.

13. Rick uses a ladder to clean the windows of his house.

 - The ladder is 26 feet long.
 - The side of the house is perpendicular to the ground.
 - The top of the ladder is 24 feet above the ground.

What is the horizontal distance from the house to the bottom of the ladder?

A. 2 feet

B. 7 feet

C. 10 feet

D. 35 feet

14. Erika stretched for 10 minutes before she went running in the park. At the park, she ran at a rate of 8 minutes per mile. She spent another 5 minutes stretching after her run. If Erika ran x miles, which equation represents the total time, y, Erika spent stretching and running?

A. $y = 15x + 8$

B. $y = 10x + 13$

C. $y = 8x + 15$

D. $y = 5x + 18$

15. A stem-and-leaf plot of Alicia's quiz scores is shown below.

Alicia's Quiz Scores

| 6	2 8
7	4 4 6
8	0 0 2 3 9
9	1 2 2 6 9
10	0

Key
6 | 8 = 68

Alicia's teacher drops each student's lowest quiz score when calculating the student's quarterly mean. What will be Alicia's quarterly mean, to the nearest hundredth, after the lowest quiz score is dropped?

A. 82.50

B. 83.63

C. 85.07

D. 86.13

16. An electric pump can move 2 quarts of water per second. What is 2 quarts per second in gallons per hour?

A. 30 gallons per hour

B. 60 gallons per hour

C. 1800 gallons per hour

D. 3600 gallons per hour

17. The box-and-whisker graph below shows the spread of points the Wildcats scored in each game one season.

Points Scored

30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60
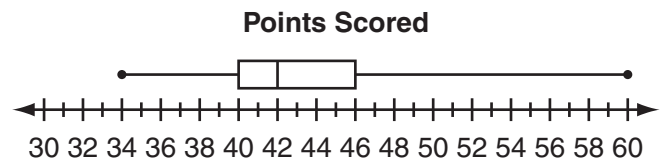
Which statement **must** be true?

A. The Wildcats scored 60 points exactly once in the season.

B. The Wildcats scored more than 34 points in all their games.

C. The Wildcats scored 46 or more points in at least half of their games.

D. The Wildcats scored 42 or fewer points in at least half of their games.

18. Study the rectangular prism below.
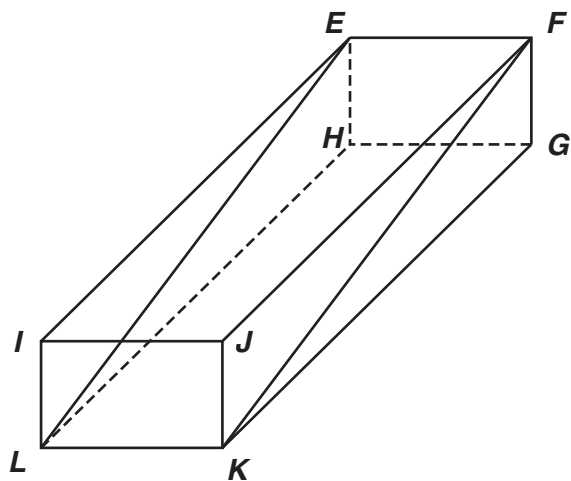
What kind of quadrilateral is *KLEF*?

A. a rectangle

B. a rhombus

C. a trapezoid that is not a parallelogram

D. a parallelogram that is not a rectangle or a rhombus

19. The number of points a basketball player scored in each of the past nine games is listed below.

14, 8, 10, 12, 10, 14, 14, 12, 14

How many points does the player need to score in the tenth game to raise the mean exactly 1 point?
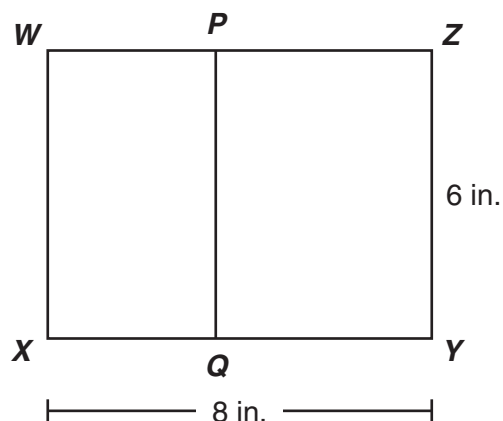
A. 22

B. 18

C. 13

D. 12

20. Look at this pattern.

$$\frac{1}{2}, \ \frac{2}{3}, \ \frac{3}{4}, \ \frac{4}{5}, \ \cdots$$

Which expression represents the *n*th term in this pattern?

A. $\dfrac{1}{n+1}$

B. $\dfrac{n}{n+1}$

C. $\dfrac{n}{n+2}$

D. $\dfrac{n+1}{n+1}$

21. Study the figure below.

not drawn to scale

Rectangle *PQYZ* is similar to rectangle *XYZW*. What is the length of $\overline{PZ}$?

A. 2 inches

B. $2\frac{1}{4}$ inches

C. 4 inches

D. $4\frac{1}{2}$ inches

22. The diameter of cylinder A is 4 times the diameter of cylinder B. However, the heights of the cylinders are equal. How many times as great is the volume of cylinder A compared to the volume of cylinder B?

A. 4 times

B. 8 times

C. 16 times

D. 64 times

23. Study the graph below.
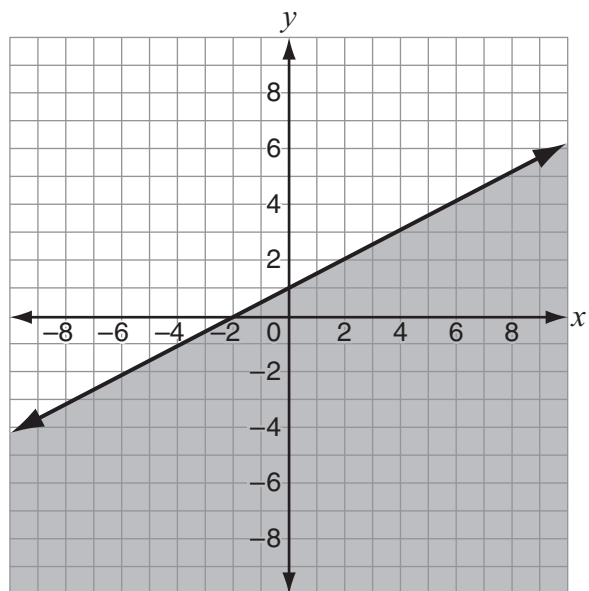
Which of the following represents the inequality shown on the graph?

A. $y \leq \frac{1}{2}x + 1$

B. $y < \frac{1}{2}x + 1$

C. $y \leq \frac{1}{2}x - 2$

D. $y < \frac{1}{2}x - 2$

Science Directions

This Science test contains three test sessions. Mark or write your answers in the Answer Booklet. Use a pencil to mark or write your answers.

This test includes two types of questions: multiple-choice and constructed-response questions.

For the multiple-choice questions, you will be given four answer choices—A, B, C, and D. You are to choose the correct answer from the four choices. Each question has only one answer. After you have chosen the correct answer to a question, find the question number in your Answer Booklet and completely fill in the circle for the answer you chose. Be sure the question number in the Answer Booklet matches the question number in the Test Booklet. The example below shows how to completely fill in the circle.

CORRECT MARK	INCORRECT MARKS
●	◯ ⊙ ◉ ⦸

If you decide to change your answer to a question, erase the wrong mark completely before filling in the circle of the new answer. Be sure you have only one answer marked for each question. **If two circles are bubbled in for the same question, that question will be scored as incorrect.**

If you are having difficulty answering a question, skip the question and come back to it later. Make sure you skip the circle for the question in your Answer Booklet.

For the other types of questions in the Test Booklet, you will be asked to write your answers in the box provided. Read the question carefully. If a question asks you to explain your answer or to show your work, be sure to do so.

You may make notes or use highlighters in your Test Booklet, but you must bubble or write your final answers in your Answer Booklet. **Do not make any stray or unnecessary marks in your Answer Booklet.**

Let's work through a sample question together to be sure you understand the directions.

Sample Question

1.   What is the state animal of Montana?

   A. elephant
   B. giraffe
   C. grizzly bear
   D. zebra

Science

1. A student views two different slides under a microscope. One slide is a squashed and stained onion root tip. The other slide is a stained cheek cell smear. Which cell part containing mostly lipids and proteins is visible in both slides?

   A. cell wall
   B. centriole
   C. cell membrane
   D. central vacuole

2. Carbon-16 is a radioactive isotope with a half-life of 0.75 seconds. If 48 mg of Carbon-16 are initially present, how much Carbon-16 will remain after 3 seconds?

   A. 3 mg
   B. 12 mg
   C. 16 mg
   D. 24 mg

3. Which property is **least** useful in classifying rocks?

   A. hardness
   B. layering
   C. size
   D. texture

4. Physicists plan to use a particle accelerator called the Large Hadron Collider (LHC) to speed up and energize beams of subatomic particles. By causing the accelerated subatomic particles to collide at very high energy, the physicists hope to recreate the conditions that immediately followed the Big Bang. How could the LHC help increase our understanding of the universe?

   A. by creating new elements to add to the universe
   B. by providing evidence regarding the origin of the universe
   C. by proving the origin of the universe
   D. by changing the electrical charges of subatomic particles in the universe

5. A box with a mass of 2 kg is sliding at a speed of 5 m/s on a horizontal table. A short time later, its speed is 2 m/s. Which sentence **best** explains why the box slows down?

   A. The kinetic energy of the table has increased.

   B. The potential energy of the table has decreased.

   C. The kinetic energy of the box has transformed into heat energy.

   D. The potential energy of the box has transformed into kinetic energy.

6. The Kootenai tribal nation moved in early spring to fishing grounds. They used a unique covered canoe, called a yaksumit, to navigate waters that could be either still or fast-moving. The canoes were made of pine bark, cedar wood, maple sap, and coniferous pitch. How did the Kootenai people know which materials to use to build the yaksumit?

   A. They researched canoe construction in written tribal documents.

   B. They observed the properties of the natural materials available to them.

   C. They knew these trees were the only ones available to them in the spring.

   D. They traveled to other regions to consult with other tribal nations that used canoes.

7. The results of a student's investigation are shown in the graph below.

Effect of Water and Soil on Seed Sprouting

Key
☐ Sand
■ Potting soil
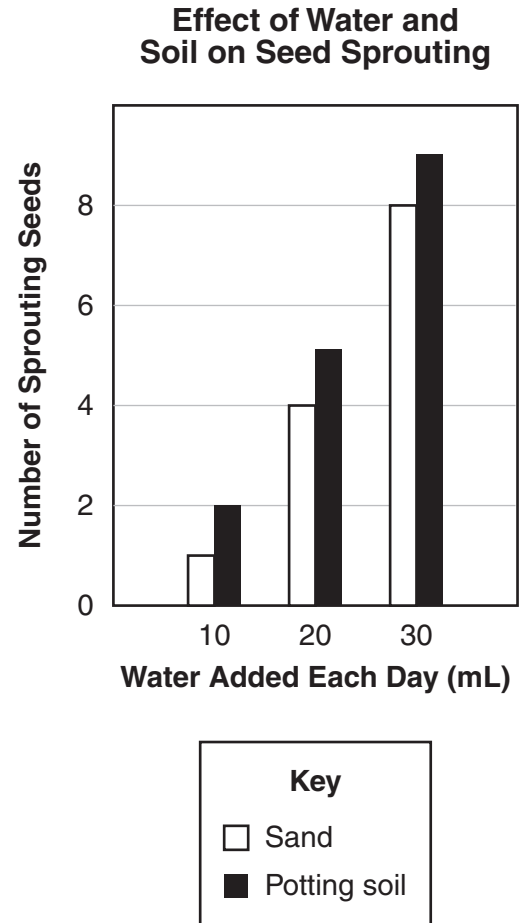
What was the dependent (responding) variable in the investigation?

   A. type of potting soil

   B. amount of water added

   C. amount of light received

   D. number of sprouting seeds

8. What happens when sodium and chlorine are combined?

   A. An ionic bond is formed.

   B. A covalent bond is formed.

   C. Sodium and chlorine do not bond.

   D. Sodium and chlorine form a mixture.

9. When does scientific thought advance **most** slowly?

   A. when a new technology is introduced

   B. when countries are isolated from each other

   C. when educational opportunities are increased

   D. when international companies are cooperating with each other

10. A student is designing a classification system for vertebrate organisms. The student learns that some modern whales have hip and leg bones as shown in the diagram below.
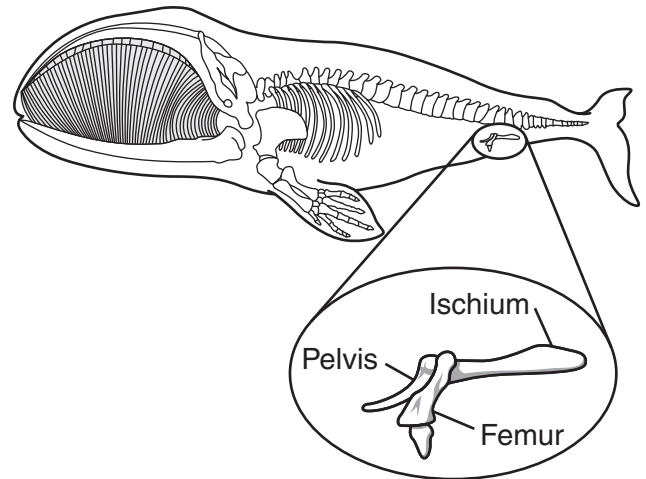
How should the student use this information when designing the classification system?

   A. by classifying whales as land animals

   B. by showing that whales share a four-limbed ancestor with other vertebrates

   C. by ignoring these bones because they are no longer used by whales

   D. by not including whales in a vertebrate classification system

11. The nucleotide sequence for one strand of a DNA molecule is below.

TACGAGGACTTG

Which sequence represents the RNA molecule transcribed from this DNA sequence?

   A. ATGCTCCTGAAC

   B. AUGCUAAUGAAC

   C. AUGCUCCUGAAC

   D. GCAUCUUCAGGU

12. Scientists investigated how different sports affect bone densities in female college athletes. The graph below shows the results of the investigation.

Effects of Different Sports on Bone Densities in Female College Athletes
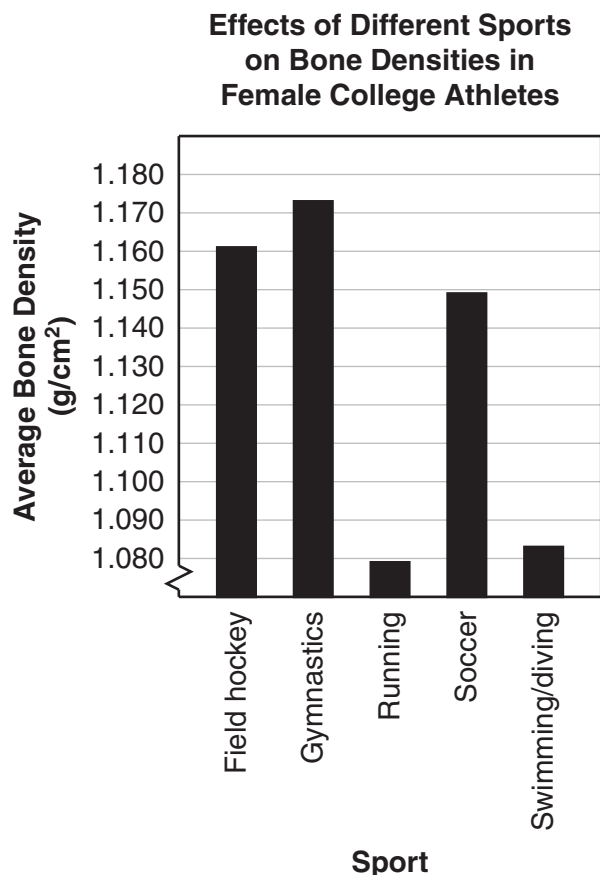
Which conclusion about female college athletes is supported by the data in the graph?

A. All running sports increase bone density.

B. All sports have positive health benefits.

C. Soccer players have higher average bone densities than field hockey players and gymnasts.

D. Runners, swimmers, and divers have lower average bone densities than the other athletes measured.

13. A laboratory contains four balls made of aluminum, glass, rubber, and wood. Each ball rests on its own insulated stand. Each ball is touched with an electrically charged object. Which ball will distribute the electric charge fastest throughout its entire surface?

A. the aluminum ball

B. the glass ball

C. the rubber ball

D. the wood ball

14. An astronomer observes the apparent shift in a star's position over time as Earth revolves around the Sun.

(not drawn to scale)
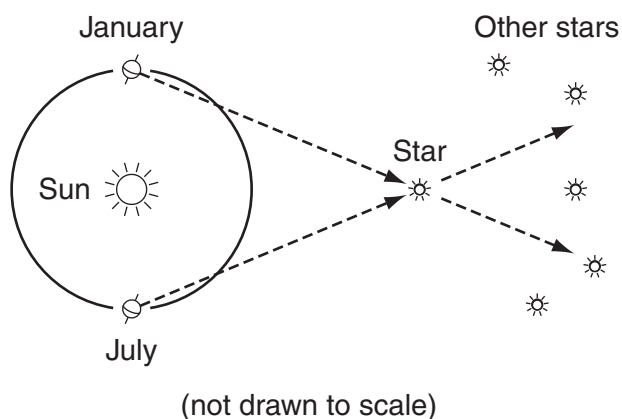
Which statement **best** explains why the star's position shifts relative to the other stars?

A. The star is orbiting the Sun.

B. The star is closer to Earth in January than it is in July.

C. The Earth's orbit changes shape over time.

D. The star is closer to Earth than the other stars are.

15. In which location is new crust created as tectonic plates move away from each other?

    A. along the San Andreas Fault in California during an earthquake

    B. along the divergent boundary forming the Mid-Atlantic Ridge

    C. at Mount St. Helens in Washington during a volcanic eruption

    D. along the convergent boundary bordering South America's Pacific coast

16. What do all catalysts do?

    A. increase reaction rates

    B. change the pH of a substance

    C. cause an element to lose an electron

    D. transport large molecules across cell membranes

17. Glacier National Park had 150 named glaciers in 1850 but has only 26 named glaciers today. Which factor has caused many of the named glaciers to melt?

    A. The northern Rocky Mountains are slowly sinking, which brings the glaciers down to lower altitudes where the air is warmer.

    B. An increased number of tourists walking on the glaciers in recent years has caused them to melt faster.

    C. The glaciers today have a longer melting season due to a gradual increase in average annual temperatures.

    D. The rate of glacial melt has increased as residents of western Montana have depleted Flathead Lake.

18. Which process provides ATP energy directly to a cell?

    A. diffusion

    B. digestion

    C. photosynthesis

    D. respiration

19. A student uses Mohs' scale, shown below, to determine the hardness of an unknown mineral.

Mohs' Scale

Mineral	Hardness
Talc	1.0
Gypsum	2.0
Calcite	3.0
Fluorite	4.0
Apatite	5.0
Orthoclase	6.0
Quartz	7.0
Topaz	8.0
Corundum	9.0
Diamond	10.0

The unknown mineral scratches talc, calcite, and apatite. It does not scratch quartz or corundum. Which hardness is closest to the hardness of the unknown mineral?

    A.   4.0

    B.   6.0

    C.   8.0

    D. 10.0

20. In which example is energy being removed from a liquid?

    A. a lake freezing in the winter

    B. sugar dissolving in a hot drink

    C. a frozen juice bar melting on a hot day

    D. a snowman getting smaller without melting

21. The diagram below shows a sagebrush food web.
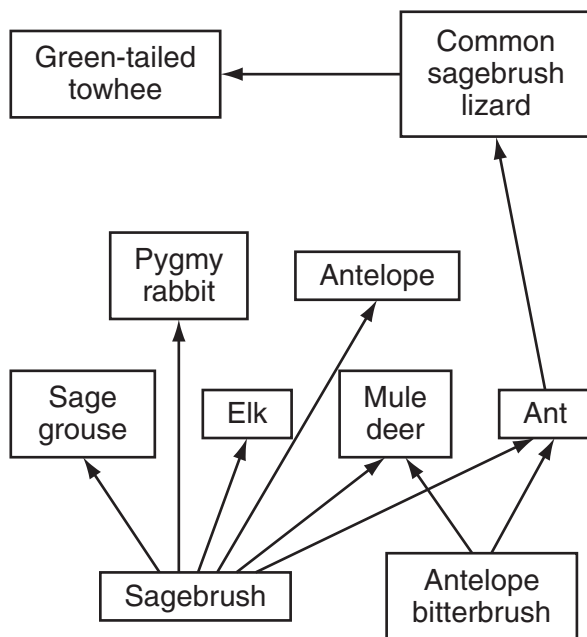
Which species would be **most** affected by a decrease in the amount of sagebrush?

    A. ant

    B. common sagebrush lizard

    C. elk

    D. mule deer

22. After a forest fire, large numbers of sprouts grow from the extensive root systems of quaking aspen trees. The sprouts grow rapidly and soon dominate the site of the fire. How did these characteristics **most likely** become common in quaking aspen trees?

    A. Forest fires caused changes in the DNA of quaking aspen trees that resulted in these characteristics.

    B. Rapidly growing sprouts are never-changing traits common to all trees that live in areas with frequent forest fires.

    C. The ashes of previous forest fires contained chemicals that stimulated the growth and extension of root systems in ancestral quaking aspen trees.

    D. Forest fires created conditions in which quaking aspen trees with these characteristics survived and reproduced more than other quaking aspen trees.

23. An electromagnetic wave is defined as energy that can travel through space in the form of a wave. Which example is an electromagnetic wave?

    A. a water wave in the ocean

    B. a sound wave from a blown whistle

    C. an underground wave caused by an earthquake

    D. a light wave between the Sun and Earth's atmosphere

24. A scientist tested the hypothesis that larger organisms have smaller cells than smaller organisms have. Using a microscope, he measured the lengths of three cells of six different cell types. The data table below shows the scientist's results.

Cell Type	Cell Length (μm)		
	1	2	3
Bacteria	1.0	0.8	1.1
Algae	50.0	60.2	65.3
Earthworm	36.4	31.2	39.0
Onion skin	420.3	379.7	410.2
Human cheek cell	50.1	52.8	65.7
Human blood cell	40.2	30.1	20.6

In the table, the organisms are listed from smallest to largest. Which conclusion is supported by the data?

A. Larger organisms have smaller cells.
B. Smaller organisms have smaller cells.
C. Cell sizes of all organisms are the same.
D. Cell sizes of all organisms are variable.

25. Which creates the **greatest** biological diversity within the human population?

A. DNA replication
B. good nutrition
C. sexual reproduction
D. vaccinations against disease

26. Many Montana American Indians traditionally made a food commonly called pemmican from dried meat and animal fat. Nuts and dried berries were sometimes added. Each tribe named the food in their language and used their own recipe. The Dakota (Sioux) tribe sometimes added chokeberries and called the food *wasna*. The Crow tribe called it *laxshe*. The pemmican was compressed in rawhide bags and did not spoil if prepared properly.

a. Explain **two** characteristics of tribal lifestyle that made pemmican a valuable food.

b. Describe **two** properties of pemmican that make it nutritionally valuable.

Scoring Guide

Score	Description
4	Response demonstrates a thorough understanding of the historical impact of scientific and technological advances. Response includes two characteristics of tribal lifestyle that made pemmican a valuable food and two properties of pemmican that made it nutritionally valuable. Response contains no errors or omissions.
3	Response demonstrates a general understanding of the historical impact of scientific and technological advances. Response contains minor errors or omissions.
2	Response demonstrates a limited understanding of the historical impact of scientific and technological advances. Response contains major errors or omissions.
1	Response demonstrates a minimal understanding of the historical impact of scientific and technological advances.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes

a. Characteristics of tribal lifestyle that made pemmican a valuable food include:

- Living in many different places throughout a year (nomadic)
- Traveling long distances without eating
- Experiencing very harsh winters
- Eating high-protein diets
- Not always having time to prepare foods

Explanations may include the following characteristics of pemmican:

- The ingredients for pemmican are available throughout Montana.
- Pemmican was nutritious and filling.
- Pemmican provided essential nutrients for survival.
- Pemmican provided the additional nutrients required for survival.
- Pemmican was lightweight, easily carried and compact.
- Pemmican was easy to make.

b. Properties of pemmican that make it nutritionally valuable include:

- Carbohydrates and lipids for energy
- Proper nutrition to maintain strength; protein to maintain and build muscle tissue
- Proper nutrition to fight disease (enzymes and vitamin for co-enzyme function)
- Essential nutrients for survival

Part (a) is worth 2 points; part (b) is worth 2 points.

Example of Score Point 4

A) Many tribes were nomadic so a light, long lasting food source was very important. Pemican also provides many nutrients and calories, something very important to anyone with a physically demanding lifestyle.

B) Pemican contains nuts and berries, which can provide many vitamins and nutrients, as well as meat, a good source of protein.

Example of Score Point 3

The pemmican can be stored esily and eaten right away and it was good to tate on the run. The protien from the meet along with the carbohydrates from the plents made it a fearly good food for you.

Example of Score Point 2

a.) A characteristic of tribal lifestyle that would have made pemmican a valuable food was the fact that they were always moving to follow their food source. Trusting that the pemmican was prepared correctly and did not spoil, it would have been an excellent food source when the tribe was traveling.

b.) One property of pemmican that would make it nutritionaly valuable would be the meat. The meat would provide for a person's necessary protein intake in the absence of other nourishment. Another property that would make it nutritious would be the nuts and berries

Example of Score Point 1

a) Native Americans who worked hard and were patient made the food right and this made the food valuable.

B) The food is made from berries and animal fat so it is all organic and nothing bad is added into it. Berries probably helped them have a balanced diet.

Example of Score Point 0

Their language and food
dried Berris and animal fat

Acknowledgments